

REMARKS

The applicant would like to thank the examiner for the time taken in considering the application as well as for her kind assistance during a telephone conversation on the administrative aspects of filing a response to the final office action. The field of use of the invention is fairly complex, and the applicant appreciates the work which has gone into preparing the final office action.

Summary invention and examiner's comments

The invention concerns a novel method for the realization of « transitory image » optical microrelief through the use of anisotropic wet chemical etching of <100> oriented monocrystalline silicon. The structure obtained by this novel method is replicable onto a nickel shim according to a method identical to that used for the manufacture of holographic foil; however, it is subsequently replicable onto a wider variety of substrate materials than holographic structures obtained by any method. Among other features, our method allows two types of transitory image relief previously patented by American Banknote Corp. (now American Banknote holographics) as well as a third type of transitory image relief not currently patented.

In response to a first USPTO communication sent on February 16, 2008, the applicant agreed to abandon claim 1, abandon claims 3 – 5, and would be pleased to file documents to reword dependent claims 6 – 20 appropriately.

In a second USPTO communication received August 18, 2008, the patent application is rejected on the further ground that it would – at the time of filing – have been **obvious to a**

person having ordinary skill in the art. The present response to the examiner's comments intends to show that this is emphatically not the case.

Response to the examiner's comments

In this application, the aim is to create *a type of OVD* based on transitory image structures. The motivation for this was that at the 4 lines/mm (10 lines/inch) possible at the time, transitory image structures did not:

- (a) provide a sufficiently convincing rendering on paper substrates,
- (b) apply well by any other method than Intaglio printing, and
- (c) really afford protection against a determined counterfeiting attempt.

The 4 lines/mm limitation arises mainly from the method used to make the transitory images, essentially: classic machining using very fine milling bitts. Needless to say that transitory images were considered obsolescent at the time this application was filed.

In the meantime, optically variable devices (OVDs) had evolved¹ towards holographic or diffractive structures characterized by a line resolution of 500 – 1000 lines/mm (1,250 – 2500 lines/inch). These structures could be rendered well by pre-embossing them on a carrier film, which was then “glued” by hot-stamping on different substrates. Thus, problems (a) and (c) above were resolved and problem (b) eliminated by adapting existing foil stamping technology.

As explained in our patent application, the main problem of holographic or diffractive OVD images (also called Diffractive Optically Variable Image Devices or DOVIDs) is that they have a relief height of the same order of magnitude as the relief spacing (i.e. around 1 um or 0.5 mils). This means that to apply them one **has** to first replicate the image on a carrier foil and

¹ See : [http://www.kurz.de/kurzweb/central/resource.nsf/imgref/Download_MM_0404mp.pdf/\\$FILE/MM_0404mp.pdf](http://www.kurz.de/kurzweb/central/resource.nsf/imgref/Download_MM_0404mp.pdf/$FILE/MM_0404mp.pdf)

apply an appropriate protective coating on top, since such a fine structure is very sensitive to handling and is easily destroyed.

The disclosed invention in this application gets around this problem by micromachining the original transitory image structures using the wet anisotropic etching of Silicon in Potassium Hydroxide and then borrows the Nickel shim electroforming technique used in DOVID replication to realize tools for the direct embossing, stamping or printing of transitory image structures realized according to application 10/588,291.

This cross-seeding of an essentially “academic” machining method onto a highly industrial application is at the heart of my invention. We argue that it is exactly this inventive step which is non-obvious to one skilled in the art. Our argument rests on three points :

- A. That it would have been non-obvious to a person of ordinary skill in the area of micromachining to investigate “obsolescent” transitory images.
- B. That many persons of ordinary skill in the art have worked in the field of OVDs and none have invented the particular method disclosed in application 10/588,291.
- C. That given the OVD industry’s adoption of hot foil as an image carrier and visual rendering layer, it would have been non-obvious to a person of ordinary skill to consider actually applying OVD relief directly on an object or substrate.

A. Non-obvious to investigate transitory image technology from the area of micromachining and vice-versa

As mentioned in our patent application, several persons of skill in the area of security markings and OVDs have from time to time re-visited transitory images. For example, Stone (US 6,296,281). Indeed, during a visit to De La Rue Ltd. (assignee of US 6,296,281) in 2004, it transpired that the method disclosed in our application had not even occurred to them. As a

result, the Karmic (assignee of 10/588,291) has obtained a licence from De La Rue to produce structures according to US 6,296,281 using the method disclosed in 10/588,291.

On the other hand, no persons of skill in the area of micromachining have, to our knowledge or among the references cited by the examiner, associated micromachining (let alone the specific method disclosed in 10/588,291) to the creation of transitory images.

Leech et al., quoted by the examiner come close but use micromachining to enhance the relief depth of a diffractive structure, not a transitory reflective mode structure.

Thus, the cross-seeding between the fields of micromachining and transitory images at the heart of the invention disclosed in 10/588,291 was non-obvious at the time of filing.

B. Subject matter as a whole was non-obvious even though many skilled in art have worked on area

A further work of prior art not previously cited in application 10/588,291 or by the examiner is Lee (US 7,281,810). Lee teaches that arrays of micromachined mirrors structured into controlled image zones can create a two-way image switching optical device in reflective mode (despite priority of Stone (US 6,296,281)). Lee also teaches (see claim 10) the use of an electroforming process to create a metal shim (despite priority of McGrew (US 5,521,030), Morales (US 6,749,997) and Meyer (2,409,119)). However, Lee does not teach wet etching of Silicon as a method of obtaining transitory image microrelief. Lee does not teach the application of his method(s) to the realization of transitory images and indeed image structures made according to US 7,281,810 are not true transitory images in the sense that all image zones remain visible (even if some are more emphasized than others) regardless of the angle of view. We note that he (rightly) makes no claim in this regard.

Thus it is demonstrated above that at any rate two persons having more than ordinary skill in the art did not find the subject matter as a whole obvious enough to include a mention of the method disclosed in 10/588,291, even in the sections of their respective patents related to prior art.

C. Concept of applying directly onto substrate non-obvious

In the two previous USPTO communications as well as previous sections of the present response, the applicant or examiner have cited the following prior art and relevant documents :

- ❖ US 5,521,030 – McGrew SP
- ❖ US 2,409,114 – Elleman, T et al
- ❖ US 6,749,997 – Morales et al
- ❖ US 4,092,611 – Frederiksen et al
- ❖ US 6,635,398 – Komoto et al
- ❖ US 6,119,485 – Hibino et al
- ❖ US 5,187,597 – Kato et al
- ❖ US 5,455,692 – Wreede, JE
- ❖ US 4,839,250 – Cowan, JJ
- ❖ US 4,840,757 – Blenkhorn, GP
- ❖ US 6,264,782 – Oshima et al
- ❖ US 4,728,377 – Gallagher, TJ
- ❖ US 2002/0001108 – Yeo, WG
- ❖ US 2003/0022395 – Olds, Keith A
- ❖ US 5,694,229 – Drinkwater et al
- ❖ US 4,765,865 – Gealer et al
- ❖ US 6,296,281 – Stone A
- ❖ US 7,281,810 – Lee RA
- ❖ Leech et al, Micro. Eng. 71(2) pp. 171 – 6 (2004)
- ❖ Various other academic publications and websites

A few of these (e.g. Drinkwater (US 5,694,229), Stone (US 6,296,281) and Lee (US 7,281,810)) mention actual replication of optically variable structures on substrates or objects. Only Lee teaches (see claim 23) that the relief obtained on the metal shim can be stamped onto a metal, polymer or paper substrate providing the latter has been flattened in a previous process step.

Thus, it is demonstrated that direct replication of optical relief – provided it is not on a previously flattened paper, metal or polymer substrate – is non obvious to a person of skill. In particular, the method according to claim 20 of 10/588,291, whereby the relief is replicated simultaneously with a plastic injection step.

Conclusions

It is demonstrated above that an exhaustive review of relevant prior art indicates that the subject matter as a whole of 10/588,291 was non-obvious to a person of ordinary skill. The applicant does recognize however, certain of claims 6 – 20 may be somewhat ambitious in the light of the examiner's comments. Therefore, in response to the final action communicated by the USPTO, the applicant would be most grateful if the Examiner would consider as patentable the following claims in 10/588,291:

- ❖ Claim 1 combined with claim 2 reading :
 - **Claim 1 (new):** A method for the replication by hot-embossing, hot-stamping, hot foil-stamping or plastic injection moulding of an optically variable transitory image relief pattern characterized by the use of an origination shim fabricated through a micromachining process involving successive photolithography, etch-mask layer patterning and bulk substrate wet chemical etching steps, where the bulk substrate consists of <100> oriented monocrystalline Silicon.
- ❖ Claim 6 combined with claim 7 reading :
 - **Claim 6 (new):** A Nickel shim obtained by copying an origination shim in accordance with claim 1 (new), through successive Nickel electroforming steps.
- ❖ Claims 8 – 15.
- ❖ Claims 17, 19 and 20.
- ❖ **Summary of remaining claims (13 total) :** Claim 1(new), claim 6(new), claims 8 – 15, claim 17, claim 19 – 20.

The applicant hereby is willing to renounce claims 3 – 5, claim 16 and claim 18.

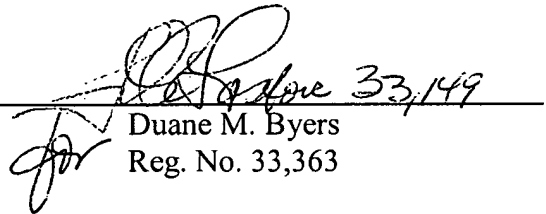
LEUNG KI
Appl. No. 10/588,291
November 18, 2008

As instructed by the applicant, the undersigned is submitting the foregoing Remarks in a sincere effort to move this case to allowance. If the Examiner would like to speak with the undersigned on the phone about claim amendments to move this case to allowance, the undersigned would be pleased to do so.

Respectfully submitted,

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By: _____


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